

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY



(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference Case 22227 wo		FOR FURTHER ACTION See Form PCT/PEA/416	
International application No. PCT/EP2004/000590	International filing date (day/month/year) 24.01.2004	Priority date (day/month/year) 31.01.2003	
International Patent Classification (IPC) or national classification and IPC A23L1/00			
Applicant DSM IP ASSETS B.V. ET AL			
<p>1. This report is the International preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input checked="" type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input checked="" type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 31.08.2004		Date of completion of this report 02.05.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2260 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Tallgren, A Telephone No. +31 70 340-3933 	

**INTERNATIONAL PRELIMINARY REPORT
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International application No.
PCT/EP2004/000590

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
- ☐ publication of the international application (under Rule 12.4)
- ☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-6 as originally filed

Claims, Numbers

1-19 received on 29.11.2004 with letter of 26.11.2004

Drawings, Figures

1 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☒ the claims, Nos. 19
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. II Priority

1. ☐ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
- ☐ copy of the earlier application whose priority has been claimed (Rule 66.7(a)).
 - ☐ translation of the earlier application whose priority has been claimed (Rule 66.7(b)).
2. ☒ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:
- see separate sheet**

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-18
	No: Claims	
Inventive step (IS)	Yes: Claims	1-18
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-18
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)

and / or

2. Non-written disclosures (Rule 70.9)

see separate sheet

**INTERNATIONAL PRELIMINARY
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(SEPARATE SHEET)**

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ITEM I

The amended claims 1,4,15-18 (also 2,3,5-14) fulfill the criteria set by article 34(2)b and are therefore accepted (based to old claims 3, 15,16 and page 3 lines 1-6, 33,34).

The new claim 19 is not accepted, because it is not disclosed in the description. The description is clearly limited to compositions containing at least 25 % pectin and at least 0.2 % carotenoid. This broader claim 19 describing composition comprising pectin with a degree of esterification below 50 % and a carotenoid (obtainable by a process as claimed 15-18) cannot be as such retrieved from the original description.

ITEM II

Claim 15 (16,17) refers to a salt of a cation of two or more valencies (d), which is not described in the priority document. The priority date of the priority document is valid for claims 1-14, 18 and 19, but the relevant date is the filing date for claims 15-17.

ITEM V

The following document is referred to:

- D1: WO 00/70967 A (JACOBSEN SOEREN JAN ;CHR HANSEN AS (DK); KENSOE MARTIN (DK); KOEHL) 30 November 2000 (2000-11-30)
- D2: US-A-4 519 961 (GRAFEN PAUL ET AL) 28 May 1985 (1985-05-28)
- D3: WO 91/06292 A (DANOCHEMO AS) 16 May 1991 (1991-05-16) cited in the application

Novelty of claim 1 (2-14)

According to the state of the art, see e.g. D1, page 5, lines 11 to 13, esterification (= acid groups of galacturonic acid are esterified with methanol) differs from acetylation (= hydroxyl groups of galacturonic acid are acetylated). The degree of esterification, shortly "DE", therefore also differs from the degree of acetylation, shortly "DA". Present claim 1 names as essential feature a pectin with a DE below 50%. This feature is not mentioned in D1, D2 or D3. Therefore, claim 1 is novel against prior art (Art 33(3) PCT).

With the novel independent claim 1 the dependent claims 2 to 12 and the claims 13 and 14 directed to food comprising such compositions are also novel.

Novelty of claim 15 (16-18)

Novel features of claim 15 are steps a) and d). In none of the documents D1, D2 and D3 is mentioned to use a pectin with a DE below 50% and to spray an emulsion containing it into a bath of an aqueous solution of a salt of a cation of two or more valencies. Therefore, claim 15 is novel against this prior art (Art 33(3) PCT). With the novel independent claim 15 the dependent claims 16-18 are also novel.

Inventive step of claim 1 (2-14)

The compositions of the present invention differ from the compositions of D1 in that they contain a pectin with a DE below 50% instead of a pectin with a high DA such as beet pectin, chicory pectin and Jerusalem artichoke pectin. Nothing in the prior art cited points to the use of a pectin having a DE below 50% for carotenoid compositions. Further, the compositions of the present invention possess unexpected and valuable properties in that they pass the stomach mostly undissolved (see page 1, lines 12 to 15 and page 4, lines 17 to 20). Nothing in the prior art cited discloses or suggests such properties. The person skilled in the art starting from D1 does not get any hint in D2 or D3 (or other documents cited in the search report) to choose a pectin with a DE below 50%. Therefore, claim 1 is found inventive (Art 33(3) PCT). With the independent claim 1 involving inventive activity, the dependent claims 2 to 12 and the claims 13 and 14 directed to food comprising such compositions also involve inventive activity.

Inventive step of claim 15 (16-18)

D2 describes a process comprising the following steps (column 2, lines 18 to 41):

- a) preparing an aqueous solution of a film-forming colloid such as a pectin (column 1, lines 26 to 35, especially line 31);
- b) dispersing an oil-soluble substance, e.g. a carotenoid, in the solution prepared in step a),
- c) atomizing the thus resulting dispersion in a spray tower in the presence of a hydrophobic silica (examples 1 and 5) or a metal salt of a higher fatty acid or a mixture thereof as spraying auxiliary;
- d) collecting the resulting particles in a fluidized bed.

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In the process of D2 non-hydrophilic substances are used as spraying auxiliaries. It is mentioned that particles laden with these spraying assistants do not gelatinize (column 2, lines 38 to 39 and lines 60 to 64). In contrast in step d) according to the process of the present invention claimed in claim 15 hydrophilic salts (in the bath of an aqueous solution of) of cations of two or more valencies are used as gel forming agents.

The features of steps a) and d) of the process of claim 15, which are crucial for the preparation of the composition, cannot be derived from any of the references cited in the search report. Therefore, claim 15 involves inventive activity over the references cited when taken alone or in combination (Art 33(3) PCT). With the independent claim 15 involving inventive activity the dependent claims 16-18 also involve inventive activity.

ITEM VI

There are two documents cited in the search report as PX documents (WO-A-03015537, WO-A-03018186), which may become relevant in the regional phase.

What is claimed is :

1. Edible composition comprising at least 25% by weight (based on the dry weight of the total composition) of a pectin, wherein the pectin has a degree of esterification (DE) below 50%, and at least 0.2% by weight (based on the dry weight of the total composition) of a carotenoid and/or another active ingredient.
2. Composition according to claim 1, comprising at least 50% by weight (based on the dry weight of the total composition) of pectin.
3. Composition according to claim 1 and/or 2, wherein the pectin has a degree of esterification (DE) between 30 and 45% and comprises between 60 and 75% of galacturonic acid units.
4. Composition according to one or more of claims 1 to 3, wherein the pectin is apple pectin or citrus pectin or a mixture thereof.
5. Composition according to one or more of claims 1 to 4 in the form of a dry powder.
6. Composition according to one or more of claims 1 to 5, comprising at least 1% by weight (based on the dry weight of the total composition) of a carotenoid.
7. Composition according to one or more of claims 1 to 6, wherein the carotenoid is selected from the group consisting of lycopene, α -carotene, β -carotene, astaxanthin, canthaxanthin, zeaxanthin, lutein, and mixtures thereof, respectively.
8. Composition according to one or more of claims 1 to 7, further comprising 0.01-5% by weight (based on the dry weight of the total composition) of an antioxidant.
9. Composition according to claim 8, wherein the antioxidant is α -tocopherol.
10. Composition according to one or more of claims 1 to 9, wherein the carotenoid is dispersed in oil at a ratio (by weight) of carotenoid : oil between 1 : 500 and 1 : 2.
11. Composition according to one or more of claims 1 to 9, wherein the carotenoid is completely or partly dissolved in oil at ratio (by weight) of carotenoid : oil between 1 : 1000 and 1 : 5.

12. Composition according to one or more of claims 1 to 11, wherein the carotenoid is encapsulated by the pectin.
- 5 13. Food comprising a composition according to one or more of claims 1 to 12, especially according to claim 12.
14. Food according to claim 13, which is a fruit juice or vegetable juice, sauce/puree, (dietetic) fruit or vegetable drink or (sports) drink.
- 10 15. Process for the preparation of a composition comprising a carotenoid and/or another active ingredient, which process includes the following steps :
- a) prepare an aqueous suspension comprising a pectin, wherein the pectin used has a degree of esterification (DE) below 50%,
15 b) add a composition comprising at least 0.5% by weight (based on the dry weight of the final composition) of a carotenoid or mixture of carotenoids, and/or other active ingredient(s) and, optionally, an oil to the suspension as prepared in step a) ,
c) emulsify the mixture,
d) spray the emulsion as prepared in step c) into a bath of an aqueous solution of a salt of a
20 cation of two or more valencies,
e) separate the formed microparticles from the bath and, optionally, wash the microparticles, and
f) optionally dry the microparticles obtained in step e).
- 25 16. Process according to claim 15, wherein the pectin used in step a) is apple pectin or citrus pectin or a mixture thereof.
17. Process according to claim 15 and/or 16, wherein the salt of the cation of two or more valencies used in step d) is selected from the group consisting of calcium, magnesium
30 and aluminium salts.
18. Process according to claim 17, wherein the salt of the cation of two or more valencies used in step d) is a calcium salt.
- 35 19. Composition comprising a pectin with a degree of esterification (DE) below 50% and a carotenoid and/or another ingredient obtainable by a process as claimed in one or more of claims 15 to 18.